

lished in 1891, Boltzmann makes use, not only of monocycles, but also of what he calls "bicycles," illustrating the phenomena of mutual induction of electric currents.

In 1885 Boltzmann was raised from "corresponding" to ordinary member of the Vienna Academy. He remained at Graz until about 1891, when he was called to Munich. A year or two later he visited England and called on the present writer at Cambridge, and thus a personal friendship sprang up. In 1894 the British Association meeting at Oxford, with its memorable field-day on the kinetic theory, came simultaneously with Lord Rayleigh and Sir William Ramsay's announcement of the discovery of argon. The part which Prof. Boltzmann took in these discussions will long be remembered. He received an honorary degree, and expressed some amusement at being made a Doctor of Laws. "It were better they made me Doctor of Science," he remarked. It was, however, pointed out that as an authority on the laws of thermodynamics the title was a fitting one.

In 1895 Boltzmann was transferred from Munich to Vienna, where he resided until his death, with one exception. In 1904 he was called to the University of Leipzig, and actually went there for a short time, but the change did not suit him, and he was back again in Vienna almost immediately.

In 1899 he was elected corresponding fellow of our Royal Society, and allusion has already been made to the universal and widespread enthusiasm shown over his diamond jubilee five years later.

Those who knew Boltzmann will remember the pair of heavy, highly-powerful spectacles resting on a deep groove in his nose. For many years his eyesight had been failing, and he found it increasingly difficult to complete the many researches which were on his mind. He appears to have ended his life during a summer holiday at or near Abbazia, a neighbourhood which he frequently visited with his wife and family.

We have alluded to some of Boltzmann's earlier writings more or less in chronological order. One of his most important later works is his book "Vorlesungen über Gastheorie" (Leipzig: Barth), the first volume of which bears the date 1895 and the second 1898. It fills an important gap in the literature of the kinetic theory, and renders much of Boltzmann's own work more accessible to general readers than it would be if his separate papers had to be consulted. While Boltzmann's chief energies were concentrated on the difficult problems of the kinetic theory, other branches of physics were by no means neglected. In evidence we have his book of lectures on Maxwell's theory, papers on Hertz's experiments, and an address on the methods of theoretical physics. Artificial flight also interested the Vienna physicist, who some years back gave a discourse on the subject, illustrated by models. Among his recreations allusion may be made to music. His thick fingers descending on the keys of the piano well knew how to produce those variations in timbre which are understood in Germany, but the want of which makes English people often say that the piano is devoid of soul. He would often play in trios with his son and eldest daughter.

It may be that the kinetic theory of gases is even now regarded as being less complete and perfect in itself than many other physical theories, such as the electromagnetic theory of light. But the study of irreversible phenomena stands on a far higher order of difficulty than that of purely reversible effects. If it has been impossible to build up a statistically irreversible system out of reversible elements without

making *some* assumptions, we are, at all events, in possession of theories of molecular phenomena in which the assumption in question is of the simplest and most self-evident character, and the agreement with experiment as close as could be expected. These theories are in a very large measure results of the labours of Ludwig Boltzmann.

G. H. BRYAN.

## NOTES.

THE results of the Gordon-Bennett balloon race, as announced in the daily papers, show that the sixteen competitors who started from Paris on Sunday afternoon all landed within a belt comprised between the meridians of  $1^{\circ}$  east and  $1^{\circ}$  west of Greenwich. The longest and most northerly journeys were those of Lieut. Lahm (U.S.A.), who landed near Whitby—about 400 miles from Paris—after a journey of  $23\frac{1}{2}$  hours; Signor Vonwiller (Italy), near Hull; Comte de la Vaulx (France), near Walsingham, four miles from the Norfolk coast; and the Hon. C. S. Rolls, near Sandringham. A second group landed in the south of England, this group comprising M. J. Balsan (France), at Singleton, near Chichester; Prof. Huntington (Great Britain), at Sittingbourne, Kent; and Captain Kindelan (Spain), near Chichester. The next group were carried from Paris in directions between west and north-west, and landed on or near a strip of the French coast extending from Dieppe to near Caen. These were Herr Scherle (Germany), near Dieppe; Mr. F. H. Butler (England), Comte de Castillon (France), and Señor Salamanca (Spain), all three at Blonville, near Trouville; Baron von Hewald (Germany), at Coudé, near the mouth of the Seine; Captain von Abercron (Germany), at Villers-sur-Mer; and Lieut. Herrera (Spain), at Cabourg. A little south of this group, M. Santos Dumont landed at Broglie, after having met with an accident to his arm. A different course was followed by the Belgian competitor, M. van den Driesche, who landed at Bretigny, a place  $19\frac{1}{2}$  miles south of Paris, soon after midnight.

SIMULTANEOUSLY with this competition, another of the same character, in which seven balloons took part, started from Milan. This was one of a number of aeronautical competitions organised during the month of September in connection with the exhibitions, other contests being arranged for aeroplanes, machines, and models, both with and without motive power. Whether owing to this clashing or to other causes, the aeronautical pavilion at the Milan Exhibition shows a remarkable dearth of exhibits, the only really successful attempt at a complete and well-organised exhibit being that of the Prussian Aeronautical Observatory in Lindenburg. These exhibits mostly illustrated apparatus for the meteorological study of the upper layers of the atmosphere, and their systematic display under the charge of Prussian officials in their smart military uniforms only made the absence of other important exhibits the more conspicuous.

THE second International Conference on Wireless Telegraphy, which is now sitting in Berlin, is likely to prove of great interest and importance from both the national and commercial points of view. Delegates from nearly all countries have accepted the German Government's invitation, and are now in Berlin. The preliminary conference of 1903, which was also convoked by the German Government with the hope of securing general support for its contention—that intercommunication between ships fitted

with wireless telegraphy apparatus and shore stations should be made compulsory without regard to the system employed—ended in a protocol embodying the German view being signed by all the delegates attending the conference except those of Great Britain and Italy. The basis of the discussions at the present conference will be the protocol above mentioned, though further proposals arising out of the recommendations contained therein have been put forward. At first sight the proposition of universal intercommunication seems to have considerable attractions, but many difficulties will have to be overcome before it can be carried out. The present conference may, therefore, have greater issues and unforeseen results than are expected, and the scientific world will be especially interested, as should the proposed treaty be entered into by our delegates—who are drawn from the Post Office officials, the Army, and the Navy—future improvements in wireless telegraphy would be more or less confined to a specified basis. As to which is the best system of wireless telegraphy of the many now at work, the question is one that may well puzzle the delegates, and may take many years of practical working of wireless telegraphy before it can be satisfactorily answered.

A SHORT description of a new method of colour photography, described by Prof. Lippmann before the Paris Academy on July 30, was given in NATURE of August 30 (p. 459). Mr. F. Cheshire, writing from the Birkbeck College, London, states that Mr. Julius Rheinberg suggested in the *British Journal of Photography* of January 1, 1904, "a method which is, I think, identical for all practical purposes with that now proposed by M. Lippmann." We have referred Mr. Cheshire's letter to Prof. Lippmann, who, in the reply with which he has favoured us, expresses regret that he overlooked Mr. Rheinberg's article, and agrees that the method proposed in it is the same in principle as that described by him. Prof. Lippmann adds that about three years ago he obtained successful results by this method, using very imperfect apparatus, still in his laboratory, and a grating roughly made by hand. In July last he obtained a more suitable grating, and the results of his experiments with it were described in his recent paper.

THE fifteenth International Geodetic Congress was held at Budapest last week. Sir George Darwin invited the congress to meet at Cambridge in 1909.

ON September 27 a series of severe earthquakes was felt at San Juan de Puerto Rico, and a sharp and prolonged earthquake shock occurred at St. Thomas, Danish West Indies.

THE Vienna correspondent of the *Daily Chronicle* announces that Herculaneum is to be excavated by the united action of England, France, Germany, Italy, the United States, and other countries.

To honour Prof. Ronald Ross, Prof. Boyce, and Dr. J. L. Todd, and in recognition of the decoration recently conferred on them by the King of the Belgians for services in research into tropical diseases at the Liverpool School of Tropical Medicine, the Lord Mayor of Liverpool gave a luncheon at the Town Hall on Monday. Sir Alfred Jones announced that the King of the Belgians has just subscribed the sum of 1000*l.* to the Liverpool School.

THE first International Congress for Cancer Research met last week at Frankfurt-on-Main under the presidency of Profs. von Leyden, Czerny, and Ehrlich. All those

invited to take part in the work of the congress are actively engaged in cancer research, and a number of important papers were contributed, so many, in fact, that discussion had to be restricted; and the clinical, experimental, and statistical branches of the cancer problem were fully represented. Their Royal Highnesses the Grand Duke and Grand Duchess of Baden were present at the opening ceremony.

THE council of the Institution of Civil Engineers has, in addition to the medals and prizes given for communications discussed at the meetings of the institution in the last session, made the following awards in respect of other papers dealt with in 1905-6:—a Telford gold medal to Mr. G. A. Denny; a George Stephenson gold medal to Prof. W. E. Dalby; Telford premiums to Messrs. W. R. Baldwin-Wiseman, G. N. Abernethy, H. R. C. Blagden, M. R. Collins, and James Kelly; a Crampton prize to Mr. P. T. Gask. For students' papers the awards are:—Miller prizes to Messrs. Ralph Freeman, A. F. Harrison, A. J. Grindling, T. R. Grigson, J. W. D. Ball, and A. Morris. Mr. A. F. Harrison also gained the James Prescott Joule medal. The awards will be presented on Tuesday, November 6, when an inaugural address will be delivered by the president, Sir Alexander B. W. Kennedy, F.R.S.

THE authorities of the Clifton Zoological Gardens, Bristol, have recently made considerable improvements designed for the increased comfort and display of their collections. Two years ago a new lion house was built, having the cages within communicating with four open-air ones iron barred on three sides. The animals placed in these cages showed so distinct a preference for the open air, and improved so materially, that the older range of houses has been entirely reconstructed, and was thrown open to the public on Saturday, September 22, for the first time. As now reconstructed, seven open-air cages are placed along the front of the old house, and communicate with the dens within. The cages are lofty, being between 10 feet and 12 feet in height, about 12 feet wide, and 14 feet long. They are supported upon a brickwork base 4 feet in height, and separated from the public by a stout iron rail, placed 3 feet away from the cage fronts. It is noteworthy that a Rhesus monkey was formerly kept in an outer cage in the gardens for quite a number of years, winter and summer alike, and fared well even in hard frost and snow. When taken into the monkey house, however, it quickly sickened and died.

THE news of the death of Monsignor Molloy, Vice-Chancellor of the Royal University of Ireland and Rector of the Catholic University, Dublin, will be received with deep regret by all who knew him in Dublin and elsewhere. Mgr. Molloy was one of the delegates to the Aberdeen University celebrations, and died suddenly at the house of his host in Aberdeen on Monday morning. Dr. Molloy was born at Mount Tallant House, near Dublin, on September 10, 1834, so that he was in his seventy-third year. From 1874-1887 he was professor of natural philosophy in the Roman Catholic University College, Dublin. From an obituary notice in the *Times* we learn that toward the close of 1883 the bishops, who were the governing body of the University, transformed the old buildings in Stephen's Green to the Jesuit Order, and the Rev. W. Delany became president under the new régime. Dr. Molloy remained in residence in the college, and, putting his talents as a teacher at the disposal of the new administration, he succeeded Dean Neville, of Cork, as Rector of

the University in the same year. During the last quarter of a century Dr. Molloy took an important part in the administration of Irish education. He acted on the Commission on Manual Training in Primary Schools, and filled the post of assistant commissioner under the Education Endowments Act. He was at the time of his death a member of the Intermediate Education Board. As a popular lecturer on scientific subjects Dr. Molloy had few equals in Ireland, and he was a frequent speaker at the lectures of the Royal Dublin Society, of the council of which he was a member. He was the author of several scientific and literary works, including "Geology and Revelation," published in 1870, and "Gleanings in Science," in 1888.

A DEVASTATING West India hurricane has quickly followed the China Sea typhoons noted in last week's issue. The permanent Atlantic anticyclone has recently occupied a position more over the south-western quarter of the ocean, while it has been flanked on its north-eastern side by the extensive and stationary high-pressure system which has remained centred over the British Isles for several days past. In these circumstances a disturbance developing anywhere in the neighbourhood of the West Indies would be unable to take the usual sweep round by the great American bight and Bermuda for the Banks of Newfoundland. Instead, an almost direct westerly course would have to be followed into the Gulf of Mexico. This is what appears to have been the case on September 26 and 27, when a violent hurricane, centred on the eastern side of the Gulf, ravaged the Southern States, the coastal regions in particular suffering severely. The tempest raised the waters of the Gulf so high that not only were the low-lying lands inundated, but the streets of Mobile, Pensacola, New Orleans, and other large towns were several feet under water. Numbers of lives were lost, and thousands of families rendered homeless. It is stated that at Pensacola every house along the water front for a distance of ten miles was wrecked, and Fort McCrae, a military station, was completely destroyed, nearly every soul perishing. In the various towns factories and warehouses were demolished, and their contents carried out to sea. There were hundreds of maritime casualties, many of them total losses. One navy vessel was carried 200 yards inland, and a large iron steamer forced through buildings to a distance of a block from the wharf. Inland there was great destruction amongst the cotton, sugar-cane, and other crops, while very considerable structural damage was occasioned by the violence of the wind. The storm is said to be the worst since the one which destroyed Galveston.

MR. J. A. REID, Bedford, has just published a reprint, price twopence, of Huxley's essay "Time and Life: Darwin's 'Origin of Species,'" which originally appeared in *Macmillan's Magazine* for 1859.

It is announced in the September number that the *Museum Gazette* will for some time to come take more notice of the "humanities," while attention will also be directed to some of the aspects of botanical studies. Articles on fish as food, a seaside museum, mushroom-eating, the potato-disease, and pea-pods, are included in the contents of the number before us.

WITH praiseworthy assiduity, Dr. W. L. Abbott, the well-known amateur collector, continues his zoological exploration of the Malay islands. One of the latest areas explored is the cluster of small islands lying between the

Malay Peninsula and Sumatra, and collectively known as the Rhino-Linga Archipelago. The large series of mammal skins collected there is described by Mr. G. S. Miller in No. 1485 of the Proceedings of the U.S. National Museum, with the usual liberal allowance of nominal new species, based, in most cases at any rate, on what are nothing more than local phases. No. 1483 of the same serial is devoted to a review, by Mr. P. Bartsch, of the long-spined "urocoptid" land-shells from the American mainland in the collection of the museum, with the description of a number of new forms.

ALTHOUGH Japanese waters, according to Messrs. Jordan and Starks, in a paper published in the Proceedings of the U.S. National Museum (No. 1484), abound in flat-fishes, the most esteemed British representatives of that group, namely, the turbot and the sole, are unfortunately wanting in the far eastern islands, where, indeed, the genera *Rhombus* and *Solea*, as restricted by the authors, are absent. The authors make no mention of the respective values as food-fishes of any of the numerous species recorded. They regard the theory that the flounders are related to the Zeidae, and that both groups trace their ancestry to the extinct *Amphistiidae*, as an ingenious guess for which there is no positive warranty. In No. 1486 of the same publication Messrs. Jordan and Snyder discuss the Japanese killifishes (*Poeciliidae*), of which only two species are at present known.

ACCORDING to a writer in the September number of the *Zoologist*, hybrids between blackcock (or grey-hen) and the pheasant are by no means uncommon in England; in Scotland they are more rare, and on the Continent appear to be very unusual. In addition to a portion of Messrs. Clark and Rodd's notes on the birds of the Scilly Islands, the same issue contains a notice of a specimen of the pelagic fish *Scomber thunnina* taken off Yarmouth, being apparently the first of its kind recorded from British waters. There is also a notice of a "sea-monster" seen off the Irish coast. Judging from the sketch sent by one observer, it seems probable that the creature was a basking-shark (*Selache maxima*), unless, indeed, it could have been a straggler of the Indian basking-shark (*Rhindon typicus*), which attains dimensions more nearly in accord with those estimated by one of the observers for the Irish monster.

WE have received a copy of No. 45 of the Journal of the Straits Branch of the Royal Asiatic Society (June), which contains a number of articles on subjects connected with zoology, botany, folk-lore, native manufactures, and such like. Mr. C. B. Kloss communicates notes on the Sumatran pig recently described as *Sus oi*, in the course of which he points out that the species does not occur on the mainland of the Malay Peninsula, but only on the adjacent island of Pulo Battam, the fauna of which is essentially of a Sumatran type. The longest article in the issue is one by Dr. H. N. Ridley, giving an account of a recent expedition undertaken by himself to Christmas Island (Indian Ocean). The author was enabled to make considerable additions to the list of indigenous plants, and communicates some interesting observations on the changes which are taking place in the coast fauna and flora as the result of colonisation. Mr. R. Shelford continues his list of Bornean butterflies, while Mr. Kloss records a 30-foot python from Johore.

WE have received the report on the Scientific Investigations of the Northumberland Sea-fisheries Committee for the year 1905. The delay in publication is due to an



attempt to induce the Board of Agriculture and Fisheries to undertake the issue of the report. Although the attempt was unsuccessful, it is hoped that in the near future the Board will become more closely associated with fishery researches throughout the country. As the result of fourteen years' trawling experiments, correlated with Government statistics, and a review of the history of the local fisheries, the present report contains a much fuller account of the "white-fisheries" of Northumberland than has previously been possible. The experiments indicate that the stations are subject to gain and loss from the areas immediately outside, and that the inward movements include a certain number of deep-sea fish, especially plaice. When reduced to a common standard, the results demonstrate that while there was a steady improvement in the fish-population from 1892 to 1903, a decline has set in since the latter date. Recently the fish captured have been found to feed chiefly on sand-eels, in place of molluscs and crustaceans, due, apparently, to the scarcity of the two latter. The improvement in the flat-fishes of the district is attributed to protection, and it is considered that protection will likewise lead to a noticeable increase of crabs and lobsters. Important statistics are furnished with regard to the rate of growth and the migrations of flat-fish.

PROF. R. DE C. WARD contributes a valuable paper on the classification of climates to the July and August numbers of the Bulletin of the American Geographical Society. The chief systems of classification described are those of Supan, Köppen, Hult, and Ravenstein, and Prof. Ward comes to the satisfactory conclusion that the first of these is the best for general purposes. Teachers of geography will find this paper extremely useful.

THE present stage of development and the prospects of the magnesite mines of South Africa are described in the *Engineer* (vol. cii., No. 2646). They are situated between Kaapmuiden and Melelana, eighty-seven miles from Delagoa Bay and 300 miles from Johannesburg. The magnesite occurs in nearly vertical beds associated with serpentine in schists, and is worked in open cuttings. The magnesite is of good quality, and the mines have opened out an industry that is likely to be of considerable future importance.

IN the *Engineering Magazine* for September there are eight articles by prominent American engineers, the most striking being a warning by Dr. Louis Bell on the subject of over-specialisation in manufacturing methods. Standardisation, however desirable from a pecuniary standpoint, in the last resort means the cessation of active improvement. Labour-saving machinery, interchangeable parts, and systematised production have their due place to fill in the world's economy. But they need not become, as they are becoming at the present time, an excuse for stagnation; and, above all, they should not be allowed to check the development of the craftsman, who is necessary to the perpetuation of industry. The greatest industrial problem to-day is to maintain the supply of intelligent American labour in spite of the American industrial system.

THE Records of the Mysore Geological Department (vol. v.) contain the general report of the work of the department for the year 1903-4, by Dr. W. F. Smeeth, the State geologist. The work is of a very varied character, and comprises, in addition to geological inquiries, inspection of mines and explosives, prospecting, lectures, and the management of the library, laboratory, and museum. The same volume contains special reports on the Chitaldrug and Tumkur districts, by Mr. E. W. Wetherell; on the

Shimoga and Kadur districts, by Mr. H. K. Slater; and on economic minerals, by Mr. V. S. Sambasiva Iyer. In the last report the occurrence of deposits of asbestos, mica, gold, pyrites, magnesite, chromite, garnet, staurolite, and apatite is recorded. In the Memoirs of the Mysore Geological Department (vol. iii., part i.) Mr. E. W. Wetherell gives a general account of laterite, and a description of the more important exposures in the districts of Bangalore and Kolar. The origin and nature of laterite have always been such controversial questions that the author's conclusions are of special interest. He shows that the Bangalore-Kolar laterite is detrital and of lacustrine origin, and that there is no geological relation whatever between the horizontal laterite proper and the clayey lithomargic beds below. The apparent gradation from these beds into laterite is due to the fact that the laterite was lain down in water on the decomposed surface of the preexisting rocks, and subsequently the chemical changes caused by percolating water have acted both upon the laterite itself and upon the decomposed material below it.

THE excellent work that is being done by the South African Philosophical Society is well shown by the varied contents of the Transactions (vol. xvi., part iii.). Dr. R. Broom describes and illustrates *Hortalotarsus skirtopodus*, the South African dinosaur described by Seeley in 1894. Dr. R. Marloth gives some notes on *Aloe succotrina*, which he has found growing at a spot on Table Mountain, and Mr. T. R. Sim summarises the recent information concerning South African ferns and their distribution. The list he gives shows a total of 212 species. Mr. J. R. Sutton discusses the climate of East London, Cape Colony, giving a summary of meteorological observations made during the twenty-one years 1884-1904. Mr. D. E. Hutchins reviews the cycle year 1905, an important one to those interested in long-period weather forecasts, and concludes that farmers may expect general good seasons for the next two or three years, and that after 1908 there will be six years of drought. Mr. A. L. du Toit points out the considerable influence of the geological formation on the storage of underground water, and considers the potentialities of such a supply in south-eastern Bechuanaland. Dr. Thomas Muir makes known a solution to a set of linear equations connected with homofocal surfaces. Mr. W. L. Sclater gives an account of two recently discovered inscribed stones bearing on the history of Cape Colony. One is a boundary stone erected by the governor Joachim van Plettenberg at Colesburg in 1778 to mark the extreme north-eastern boundary of the colony, and the other is a stone in the castle wall with inscriptions by John Roberts, commander of the *Lesser James*, 1622, and by James Burgess, master of the *Abigail*, 1622.

THE last issue of the Journal of the Institution of Electrical Engineers contains an interesting paper on long-flame arc lamps, by Mr. L. Andrews. The paper is of especial interest at the present time, owing to the recent development of the long-flame arc, which is largely due to the enterprise and competition of the gas companies during the last two years. With the perfection of high-pressure gas the electric arc was seriously threatened, as gas lighting, without a doubt, was driving out the arc lamp from both the cost and candle-power points of view. This competition, however, has had a beneficial result, in that the long-flame arc lamp has been developed and can now more than hold its own with high-pressure gas lamps, as is proved by the fact that, after a practical trial of both systems which lasted over some time, the South-Eastern Railway Company has decided to adopt oriflame arc lamps

at the renovated Charing Cross Station, as they found by test that, on the price for price basis, the oriflame lamps gave a much better light than the high-pressure gas lamps. Mr. Andrews's paper chiefly deals with one particular kind of flame arc lamp, namely, the Carbone lamp. The paper led, however, to a discussion which opened up the question in its more general form. It is to be hoped, therefore, that the question of long-flame arcs will not be allowed to drop until a much greater development has taken place, as much is needed before we can say that it is perfect, as the efficiency of flame arc lamps still leaves much to be desired.

THE August issue of the *Psychological Bulletin* is a pathological number. In addition to an article on the relation of emotional and intellectual functions in paranoia and in obsessions (by Dr. Adolf Meyer, the editor of this number), it contains a discussion by Dr. J. W. Baird of the contraction of the colour zones in hysteria and in neurasthenia. The conclusions to which Dr. Baird's observations lead are (1) that the colour zones of the abnormal subjects examined are, on the whole, of smaller area than those of the normal subjects, and (2) wherever a contraction of the colour zones occurs a definite order is observed—the red and green zones narrow together and the blue and yellow zones together, and there is a greater degree of contraction in the red-green zone than in the blue-yellow zone.

ALTHOUGH it is well established that selenium and tellurium are isomorphous in their compounds, it is still a question of controversy whether the isomorphism extends to the substances in the elementary state. Drs. G. Pellini and G. Vio show in the *Atti dei Lincei* (vol. xxv., ii., p. 46) that the solidifying points of mixtures of these substances are proportional to the percentage compositions, and that the elements are therefore isomorphous. The hexagonal mineral tellurium from Honduras, which contains about 29 per cent. of selenium, would thus appear to be an isomorphous mixture.

A METHOD of isolating radio-thorium from thorium salts is described by Messrs. G. A. Blanc and O. Angelucci in the *Atti dei Lincei* (vol. xxv., ii., p. 90). When sulphuric acid is added to a solution of thorium nitrate containing barium chloride no precipitate is formed in the cold solution, but on warming, part of the barium is precipitated as sulphate, the precipitate carrying down some of the radio-thorium. The sulphate is converted into carbonate by fusion with sodium carbonate, and the product, after thorough washing, is dissolved in acid; on adding ammonia a slight precipitate of radio-thorium is obtained which has an activity about 5000 times as great as thorium hydroxide in a state of radio-active equilibrium.

THE use by the Königliche Porzellan Manufactur of fused magnesium oxide in the construction of tubes and crucibles has led Messrs. H. M. Goodwin and R. D. Mailey to publish the results they have obtained in an investigation of the physical properties of fused magnesium oxide (*Physical Review*, vol. xxiii., No. 1). The fused substance is a white, very hard crystalline substance, the size of the crystals depending on the rate of cooling. The melting point of the material is  $1910^{\circ}$ , the coefficient of expansion being very nearly the same as that of platinum, a fact which will prove of value in its application. The results recorded for the electrical conductivity show that up to  $1150^{\circ}$  C. fused magnesia is a better insulator than porcelain. Fused salts, as a rule, have very little action on the material, and it is attacked only slowly by cold, dilute mineral acids.

IN an article in No. 8 of *Le Radium* Mr. A. S. Eve describes a method of estimating the proportion of radium or thorium in a mineral by means of the  $\gamma$  rays which it emits. Incidentally, it is pointed out that solutions of radium bromide which are intended to serve as standards of radio-activity are liable, unless acidified, to become inexact owing to the deposition of radium on the glass of the vessels containing them. It appears advisable always to control such solutions by reference to a standard of solid radium bromide. Dr. M. Levin contributes an article on the absorption of the  $\alpha$  rays of polonium to the same number of *Le Radium*, Mr. H. L. Bronson deals with the transformation periods of radium A, B, and C, and Mr. W. H. Bragg describes investigations of the  $\alpha$  particles of uranium and thorium.

BOTH theoretically and practically the formation of "basic" salts has long been a difficulty to chemists. In the case of the carbonates, for example, no good reason has been given why the carbonates of the metals of the alkaline earths alone should be definite compounds. The current number of the *Journal of the Society of Chemical Industry* contains an interesting study of the basic carbonates of magnesium, by Mr. W. A. Davis, which throws a good deal of light on these very obscure compounds. The starting point of the work is magnesium bicarbonate. It has been shown by Treadwell and Reuter that whilst a solution of calcium bicarbonate is stable at the ordinary temperature, a solution of the corresponding magnesium compound is only stable in the presence of carbon dioxide. It is known that when the pressure of the carbon dioxide above this solution is removed crystals are deposited of the composition  $\text{MgCO}_3 \cdot 3\text{H}_2\text{O}$ , and these have been regarded as hydrated magnesium carbonate. In the present paper the author shows that this substance is really a hydroxy-carbonate,



since only two-thirds of the water can be driven off at  $100^{\circ}$  C., or by boiling with xylene. Photomicrographs of both these salts are given. The decomposition products of this hydroxy-carbonate are then studied, and the results applied to the softening of magnesian waters, the Solvay method of manufacturing potassium carbonate with the aid of magnesia, and the formation of mixed carbonates of magnesium and the alkalis. The author claims that various observations which were formerly inexplicable may be interpreted without difficulty in the light of the explanation which has been given of the manner in which basic carbonates are formed.

PROF. STRASBURGER'S interesting book on botanical and other natural characteristics of the Riviera, a review of which appeared in *NATURE* of June 22, 1905 (vol. lxxii., p. 171), has been translated into English by O. and B. Comerford Casey, and is published, with the coloured illustrations, by Mr. T. Fisher Unwin. The English version of this charming book will delight visitors to the Riviera who are unfamiliar with the German language.

A SERIES of instructive experiments in practical photography is described by Mr. T. T. Baker in a booklet entitled "Simple Photographic Experiments," just published by Messrs. Percival Marshall and Co.

MESSRS. CONSTABLE AND CO., LTD., have just published the third edition of Mr. H. H. Cunynghame's work "On the Theory and Practice of Art-enamelling upon Metals." A short description of a new furnace invented by the author has been added to the volume.